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CESAREAN SECTIONS IN NORTH CAROLINA, 1988-1993

by

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ABSTRACT

Cesarean sections are the most frequently performed surgical operation in the United States (Elson, 1994). The inclusion of method of delivery on North Carolina's birth certificate in 1988 allows the examination of trends in cesarean section rates during the 6-year period 1988-1993. This study includes an analysis of many birth characteristics and their relationship to method of delivery. Cesarean sections in this report include primary and repeat.

A cesarean section involves an incision through the abdominal and uterine walls for delivery of the infant and the placenta. Physicians perform this surgery for four common reasons: previous cesarean, dystocia (abnormal progress of labor), breech position (feet or buttocks positioned to come out first), and fetal distress (e.g., insufficient oxygen, unstable heart rate). In 1988, when method of delivery was first reported on North Carolina birth certificates, the cesarean section rate was 25.1 percent. In 1993, this rate had dropped slightly to 22.4. The highest numbers of cesarean sections occurred to women who were white, married, ages 25-29, had a high school education, and had single babies with normal birthweights (similar to the pattern for all live births). Groups with the highest percentage of live births delivered by cesarean section were whites, ages 40 and older, those with college education or beyond, and those having babies weighing less than 1500 grams.

Although cesarean sections are commonly performed, literature about them suggests that they often are performed unnecessarily. In addition to examining the data on current trends and characteristics, this report also discusses the increasing influence that VBAC (vaginal birth after previous cesarean delivery) and other factors have had on efforts to reduce overall cesarean rates.

INTRODUCTION

In 1988, when method of delivery was first reported on birth certificates in North Carolina, the state had a cesarean section rate of 25.1 percent, a vaginal delivery rate of 73.7 percent, and a VBAC (vaginal birth after previous cesarean delivery) rate of 1.2 percent (vaginal and VBAC deliveries are treated separately here). By 1993, these percentages were 22.4, 75.1, and 2.5 respectively. In 1992, the national cesarean rate was 22.6 percent, four times the rate of 5.5 percent in 1970 (Gabay and Wolfe, 1994). Efforts to reduce the overall cesarean rate often cite a goal in the range of 15 percent.

Like all surgical operations, a cesarean section involves certain risks to both mother and infant such as infection or damage to other organs. Advances in medical technology and procedures make trial of labor a viable option in certain instances that historically would have required a cesarean section. Trial of labor allows women who have had a previous cesarean section to attempt a vaginal delivery if certain pre-existing medical complications are not present.

For the period 1988-1993, this report examines cesarean section trends in North Carolina. In addition, cesarean section rates for women with different demographic and medical characteristics are analyzed.

Much of the literature on cesarean sections concludes that many cesarean surgeries are unnecessary. Due to the limitations of the data, this study does not suggest what proportion of cesareans in North Carolina may be unnecessary, although it is assumed that some cesarean deliveries in the state are not necessary. The last section of this paper reviews the national literature and highlights some of the suggestions about how the number of cesarean deliveries might be reduced among all populations.

METHODS

Birth data were obtained from the birth certificate computer files. Birth certificates are recorded by the Vital Records Section, and the computer files are maintained by the Vital Statistics Branch. Both groups are part of the State Center for Health and Environmental Statistics. The birth files that were selected include North Carolina resident births occurring during the time period 1988-1993. Births where method of delivery was unknown, 1.6 percent, were excluded from this study.

Information from birth certificates was analyzed to relate the characteristics of women to the rate of cesarean section. Race, age, marital status, and education provided information on demographic patterns. Other factors such as plurality (single versus multiple births), prenatal care, birthweight, medical history, and events of labor and delivery also were analyzed in relation to the prevalence of cesarean sections.

The cesarean section rates by county of residence and hospital of delivery are shown in Appendices A and B. The Appendices are divided into two 3-year time periods, 1988-1990 and 1991-1993. The rates, or percentage of total births, were calculated by dividing the number of cesarean section births by the total number of births where method of delivery was known and then multiplying that number (the quotient) by 100.

Other rates were calculated using the number of cesarean section births for a certain characteristic divided by the number of live births for the same characteristic and multiplying by 100. Most figures in this report group the data into two 3-year time periods, 1988-1990 and 1991-1993.

RESULTS

During the 6-year period, 1988-1993, there were 601,933 births with known method of delivery to North Carolina residents. Among these, 449,752 (74.7%) were delivered vaginally; 140,297 (23.3%) by cesarean section and 11,884 (2.0%) by VBAC.

Of the cesarean sections, 67.5 percent were primary and 32.5 percent were repeat. Among all vaginal deliveries, 6.7 percent used forceps and 8.4 percent used a vacuum.

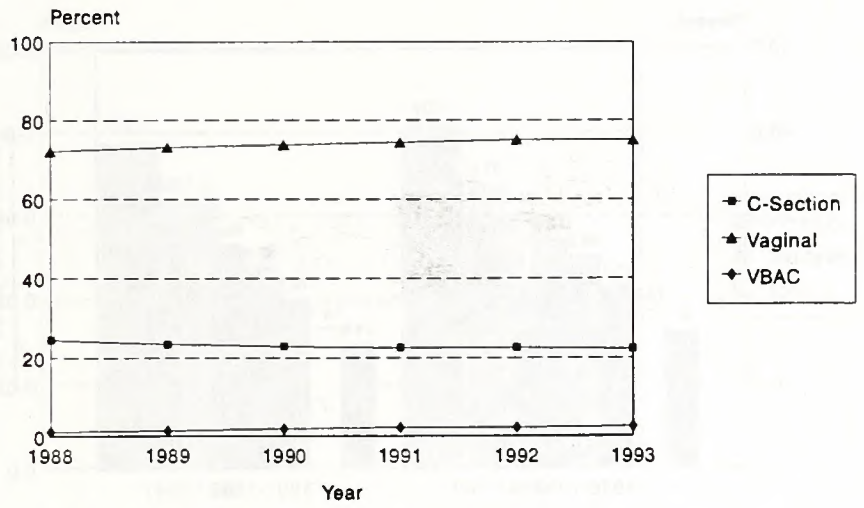
The trend from 1988 to 1993 is shown in Figure 1. North Carolina's cesarean rate decreased 4.7 percent between the time periods 1988-1990 and 1991-1993 from 23.6 to 22.5. The counties whose residents had the highest rates were Moore, Pasquotank and Camden in 1988-1990 and Camden, Pasquotank, and Alexander in 1991-1993 (Appendix A). Rates by hospital are shown in Appendix B. Higher cesarean section rates for some of the hospitals may be due to unstable percentages because of a small number of total births.

The majority of cesarean sections, 69.4 percent, occurred to white women during the years 1988-1993. Rates (per 100 live births) for black women were slightly lower than those of white women. American Indian women had a rate equivalent to white women in 1991-1993. Females of Hispanic origin had low rates of cesarean births. The rates are shown in Figure 2.

In North Carolina, women ages 25-29 had the highest number of cesarean sections performed and the highest number of total births compared to other 5-year age groups. Although women ages 40 and older only account for a small percentage of all cesarean deliveries, they have the highest rate. The rate of cesarean section increases steadily with age (Figure 3). Married women had a cesarean section rate of 24.4 percent, compared to 19.9 for unmarried women. Lower cesarean section rates were found among women who had a high school education or less (Figure 4).

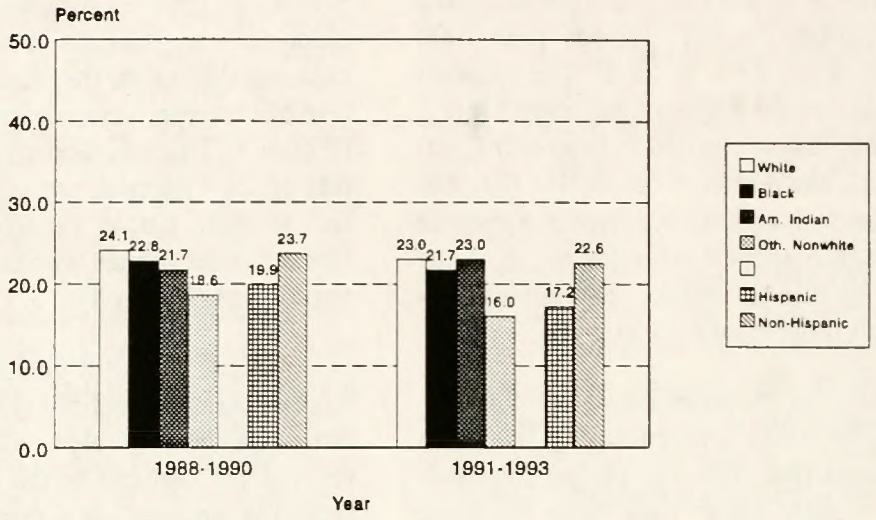
Women with low birthweight infants had high rates of cesarean sections (Figure 5). Among single births, the cesarean rate was 22.3 percent, compared to 53.2 for multiple births (twins, etc.). Mothers receiving prenatal care during the first trimester also had higher cesarean section rates during 1988-1993.

Figure 1
Method of Delivery
North Carolina Residents, 1988-1993



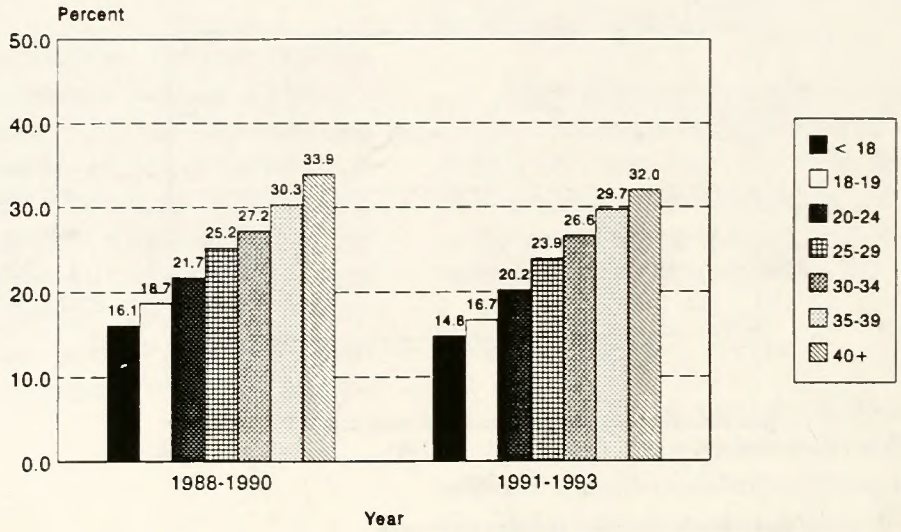
Source: State Center for Health and Environmental Statistics

Figure 2
Cesarean Sections by Race and Hispanic Origin
North Carolina Residents, 1988-1993



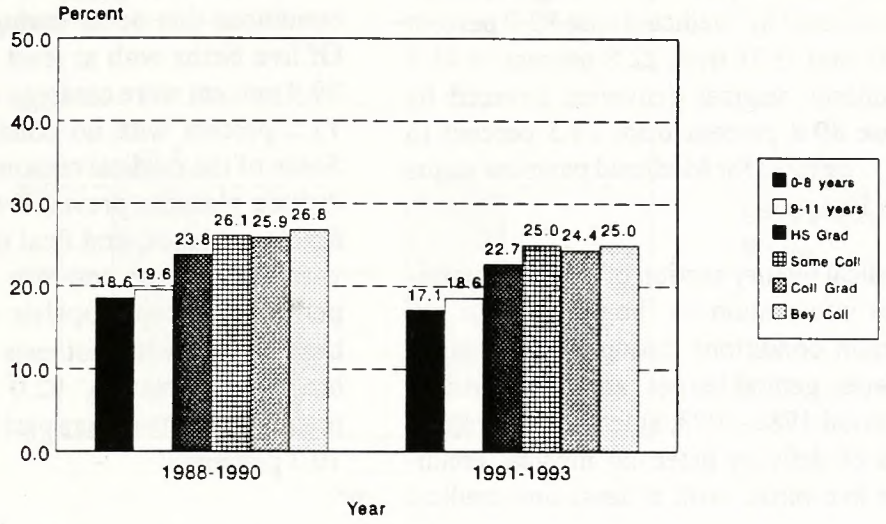
Source: State Center for Health and Environmental Statistics

Figure 3
Cesarean Sections by Age of Mother
North Carolina Residents, 1988-1993



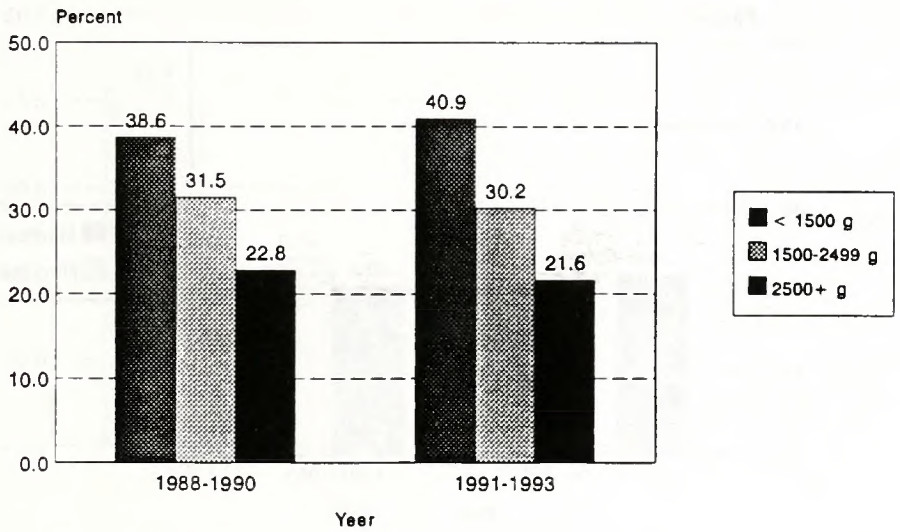
Source: State Center for Health and Environmental Statistics

Figure 4
Cesarean Sections by Years of Education
North Carolina Residents, 1988-1993



Source: State Center for Health and Environmental Statistics

Figure 5
Cesarean Sections by Birthweight
North Carolina Residents, 1988-1993



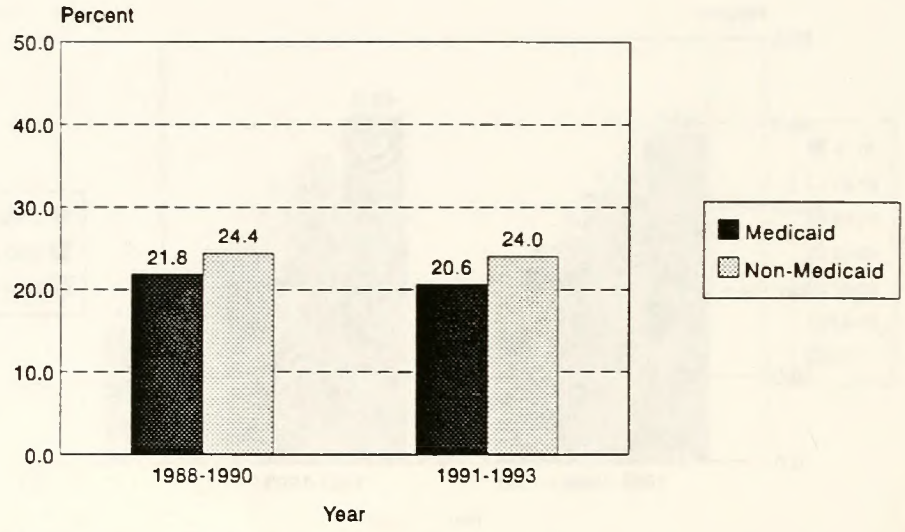
Source: State Center for Health and Environmental Statistics

According to 1992 data from the North Carolina Medical Database Commission, the median length of stay for a cesarean section was three days; and the median charge was $4,775. The same figures for a vaginal delivery were two days and $2,211 (NCMDC, 1994). The percentage of cesarean sections covered by Medicaid rose 82.0 percent between 1988 and 1993 from 22.8 percent to 41.5 percent. Similarly, vaginal deliveries covered by Medicaid rose 89.8 percent from 24.5 percent to 46.5 percent. The rates for Medicaid payment status are shown in Figure 6.

The medical history section of the birth certificate provides information on the presence or absence of certain conditions during the pregnancy such as diabetes, genital herpes, and hypertension. During the period 1988-1993, at least 64 percent of each method of delivery listed no medical conditions. Of the live births with at least one medical condition present, an average of 30.4 percent were delivered by cesarean section, compared to 20.7 percent for births with no medical condition listed (Figure 7).

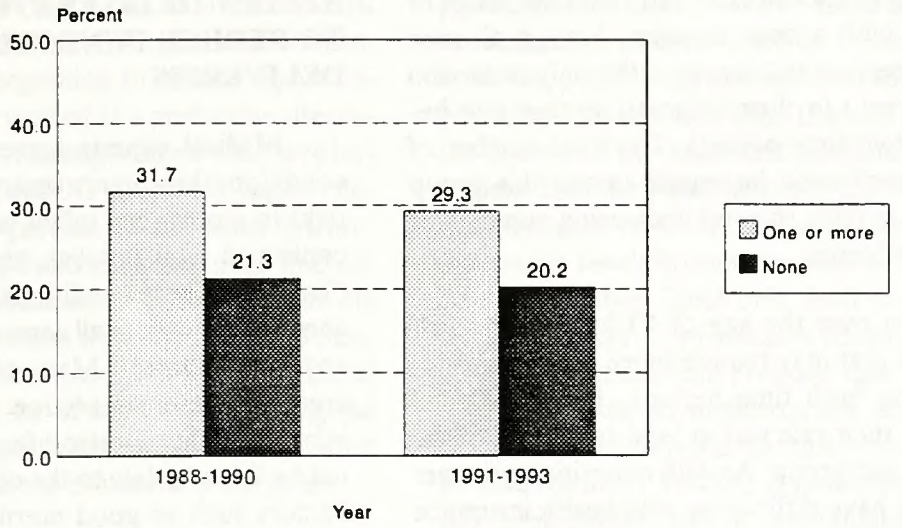
Another section of the birth certificate records conditions that occur during labor and/or delivery. Of live births with at least one condition present, 39.4 percent were cesarean deliveries, compared to 13.5 percent with no condition listed (Figure 8). Some of the medical reasons for a cesarean section include placenta previa, breech presentation, dysfunctional labor, and fetal distress. The conditions with the highest cesarean rate during the study period were cephalopelvic disproportion (infant's head larger than mother's pelvis), 98.2 percent, breech presentation, 82.0 percent, and placenta previa (placenta covers part or all of cervix at birth), 70.3 percent.

Figure 6
Cesarean Section Births by Medicaid Status
North Carolina Residents, 1988-1993



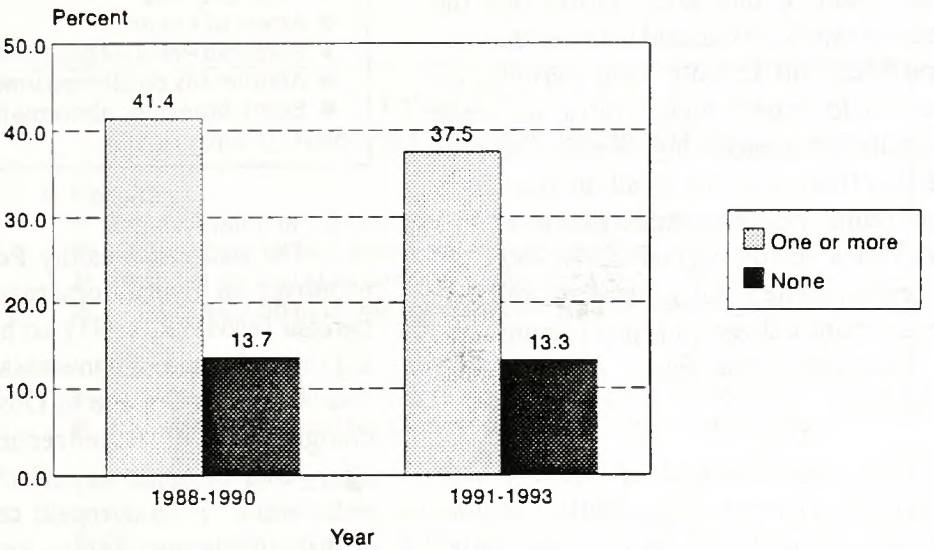
Source: State Center for Health and Environmental Statistics

Figure 7
Cesarean Sections by Occurrence of Medical History
North Carolina Residents, 1988-1993



Source: State Center for Health and Environmental Statistics

Figure 8
Cesarean Sections by Occurrence of Events of Labor/Delivery
North Carolina Residents, 1988-1993



Source: State Center for Health and Environmental Stetistics

DISCUSSION OF RESULTS

There are several possible explanations for varying cesarean section rates among demographic groups. Blacks and other minorities may have lower rates due to a lack of health insurance coverage or difficulties with access to care. Among all race groups, American Indians were the only ones who had an increase in their cesarean section rate between the two time periods. The total number of cesareans performed increased among this group while other groups showed decreasing numbers of cesarean deliveries.

Women over the age of 40 have higher risk pregnancies that may require more cesarean deliveries. During both time periods, 1988-1990 and 1991-1993, their rate was at least twice that of the less than 18 age group. As with minorities, younger women may have difficulties with health insurance coverage and access to care. Similarly, infants weighing less than 1500 grams present greater medical risk; and if it is necessary to deliver them pre-term, a surgical delivery may increase their chance of survival. Higher rates also are found when at least one medical condition or labor/delivery complication is present since these situations may result in complications for both the mother and the infant.

Another result of this study shows that the cesarean section rate for Medicaid is lower than the rate for non-Medicaid in both time periods, although one would expect higher rates since the Medicaid population presents higher risk. One reason may be that there are only small differences in the Medicaid reimbursement rate to physicians for cesarean deliveries versus vaginal deliveries. Currently, the reimbursement for a cesarean section, including antepartum, delivery, and postpartum care, is $1,336. The comparable figure for a vaginal delivery is $1,224.

Since 1988 when method of delivery was added to the birth certificate data, North Carolina has experienced a 10.8 percent decline in the cesarean section rate, from 25.1 to 22.4. In a 1992 CHES Study on the quality of birth certificate data, the results showed that for method of delivery data, 91.9 percent of birth certificates agreed with the corresponding maternal medical records from the hospital (Buescher et al, 1992).

REVIEW OF LITERATURE ON METHODS TO REDUCE UNNECESSARY CESAREAN DELIVERIES

Medical experts agree that there are certain conditions that require cesarean sections because of risks to mother and infant, such as placenta previa, confirmed fetal distress, and some breech infants (Table 1). These conditions, however, account for about 25 percent of all cesareans performed (Gabay and Wolfe, 1994). Many obstetricians equate increases in cesarean section rates with decreases in infant mortality. Better infant health, however, cannot be linked solely to the use of cesarean sections. Factors such as good nutrition and early prenatal care also play important roles in reducing infant mortality (Gabay and Wolfe, 1994).

Table 1
Some Complications of Pregnancy That Require a Cesarean Section

- Fetal Distress
- Arrest of Labor
- Placenta Previa/Abruptio Placenta
- Abnormally positioned umbilical cord
- Some breech or abnormally positioned infants

The national Healthy People 2000 objective proposes an overall cesarean section rate of 15 percent (MMWR, 1993), to be achieved by reducing the incidence of unnecessary cesarean sections. The American College of Obstetricians and Gynecologists (ACOG) issued recommendations encouraging trial of labor for selected patients and the reduction of routine repeat cesarean births. Local efforts, such as peer review among physicians, may have more impact than broad, national objectives.

One way to reduce unnecessary cesareans is to confront the traditionally-held view that they are medically necessary for the majority of women who have had a previous cesarean birth. This would be effective in reducing repeat cesareans, which account for over half of the increase in the national cesarean rate over the last 30 years (Goldman, 1993). VBACs are beginning to reduce repeat cesareans, and they are viewed as a preferable alternative for some women. Among women who have had a previous cesarean, ACOG promotes vaginal deliveries in 50 to 80 percent of the cases (Arnot, 1991). Women and physicians sometimes find cesareans convenient because the delivery can be scheduled and it takes less time. Women who have an option of trial of labor should be informed about the higher medical risks of cesarean surgeries, the higher costs, the longer recovery period, and other factors affecting both the mother and the infant.

Physicians and hospitals receive higher reimbursement for cesarean sections compared to vaginal deliveries. The cost of excess cesareans is estimated at $1 billion in one year (Wagner, 1993). Malpractice suits also contribute to high rates. Doctors may fear legal consequences if they do not safely deliver healthy babies (Paul, 1988).

Advances in medical technology provide means to safely reduce the number of cesarean sections performed. Surgeries using a low transverse incision reduce the risk of uterine rupture in later vaginal deliveries (Gabay and Wolfe, 1994). Breech presentation is one of the four main conditions that necessitate a cesarean section. External version, however, provides an alternative in some cases. The physician uses this technique to try to manually turn the fetus into the head-first position for a normal vaginal delivery. Fetal distress and dystocia (abnormal progress of labor) are other conditions that commonly result in cesarean, but their diagnosis is more subjective. Electronic fetal monitoring (the use of soundwaves to measure contractions and the infant's heartbeat) can produce false signs of fetal distress leading to inappropriate cesarean births. One recommendation is that this process should not be used routinely. Instead, it should be used with at-risk pregnancies and in combination with other monitoring techniques, such as heart-rate stimulation tests, to more accurately determine fetal distress (Gabay and Wolfe, 1994).

Hospitals, insurers, and women all have a role in reducing the cesarean rate (Table 2). Hospitals can require second opinions before and peer review after cesarean operations. They also can encourage

Table 2
Strategies to Reduce Cesarean Section Rates

- Hospitals
  - ▶ Explain option of VBAC to women with previous cesareans
  - ▶ Require peer review after cesarean operations
  - ▶ Establish clinical standards for obstetric care
  - ▶ Require second opinions for all but emergency cesareans
- Insurers
  - ▶ Provide financial incentives to women who attempt VBAC
  - ▶ Equalize physicians' fees for cesarean and vaginal deliveries
- Women and their Partners
  - ▶ Ask about cesarean section rates for hospitals and doctors
  - ▶ Discuss options of medical intervention during labor/delivery

Source: Public Citizen's Health Research Group

trial of labor in uncomplicated pregnancies. Some studies suggest that the presence of a female companion, such as a midwife, who provides personal one-on-one support can improve the outcome of labor and can enable women to better cope with the delivery process (Butler et al, 1993).

Insurers could make fees for cesarean and vaginal deliveries more equal. They also could provide incentives for trial of labor and for hospitals and physicians with low cesarean rates.

Women could take a more active role in their birthing process by having input, prior to the actual birth, in the type of delivery they prefer and the care they wish to receive. They could ask questions and be informed about cesarean rates of available hospitals and doctors at the beginning of their pregnancy. They could plan their delivery and request a trial of labor before other medical interventions are attempted; and they could receive proper care, nutrition, and exercise to reduce risks and complications (Gabay and Wolfe, 1994).

"Once a cesarean, always a cesarean" is an outdated theory. Vaginal deliveries have many advantages: lower risk of infection, easier postpartum period, shorter hospital stay, and lower cost, among others (Jones, 1991). For many healthy patients, a trial of labor should be encouraged. Many women with previous cesarean sections have successful vaginal deliveries in later births. Recent efforts to reduce the occurrence of cesarean sections promote practices such as external version for breech fetuses, confirmation of fetal distress, and accurate diagnosis of dystocia. Some unnecessary cesarean deliveries can be avoided when alternatives are considered, thus reducing the overall rate without endangering the health of the mother or the infant.

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APPENDIX A

1988-1993 Cesarean Section Rates Ranked by Rate

Rates are per 100 live births with known method of delivery

	1988-1990			1991-1993	
	NUMBER	RATE		NUMBER	RATE
NORTH CAROLINA	71099	23.6	NORTH CAROLINA	69198	22.5
MOORE	832	35.2	CAMDEN	70	35.9
PASQUOTANK	465	31.5	PASQUOTANK	485	33.9
CAMDEN	70	31.4	ALEXANDER	331	30.8
WILKES	665	30.8	IREDELL	1247	29.2
WASHINGTON	210	30.6	PAMLICO	106	29.0
CHEROKEE	176	29.9	STANLY	624	28.9
CARTERET	607	29.2	MOORE	643	28.2
MONTGOMERY	308	28.9	CALDWELL	852	28.1
YADKIN	319	28.7	JONES	109	27.9
RICHMOND	566	28.4	CURRITUCK	150	27.3
IREDELL	1142	28.3	RICHMOND	565	27.2
WILSON	839	28.2	YADKIN	319	27.0
CLAY	48	28.1	DARE	245	26.9
NORTHAMPTON	252	28.0	BURKE	796	26.5
BEAUFORT	498	27.8	LENOIR	688	26.2
HYDE	57	27.8	LINCOLN	553	26.1
JONES	121	27.8	BEAUFORT	471	25.9
ALEXANDER	282	27.7	STOKES	363	25.9
DAVIDSON	1424	27.5	CHOWAN	153	25.7
LENOIR	678	27.4	BRUNSWICK	564	25.6
GRAHAM	78	27.4	WILKES	588	25.4
CALDWELL	804	27.1	TYRRELL	38	25.3
CABARRUS	1155	26.9	GUILFORD	3941	25.3
DARE	230	26.9	CLAY	52	25.2
LINCOLN	583	26.8	ANSON	281	25.2
JACKSON	246	26.6	CARTERET	514	25.1
GUILFORD	4083	26.6	CRAVEN	1188	25.1
STANLY	580	26.5	MONTGOMERY	269	25.1
PAMLICO	112	26.5	MCDOWELL	345	25.1
DAVIE	258	26.2	ROCKINGHAM	861	25.1
TYRRELL	40	26.1	HENDERSON	630	25.0
BURKE	771	26.1	PERQUIMANS	95	24.9
PERQUIMANS	111	26.0	SCOTLAND	424	24.9
MCDOWELL	375	26.0	ASHE	172	24.9
PITT	1293	25.8	CATAWBA	1328	24.8
CHOWAN	141	25.6	SAMPSON	520	24.8
HENDERSON	621	25.5	AVERY	147	24.7
BRUNSWICK	529	25.5	DUPLIN	463	24.7
HALIFAX	695	25.4	RANDOLPH	1106	24.6
MACON	179	25.1	JOHNSTON	989	24.5
BUNCOMBE	1787	25.0	CHEROKEE	181	24.3
ROWAN	1128	25.0	WATAUGA	254	24.3
ROCKINGHAM	884	25.0	CABARRUS	1041	24.2
VANCE	500	25.0	ALAMANCE	1076	24.1
GREENE	146	24.9	FORSYTH	2845	23.8
MARTIN	268	24.8	DAVIDSON	1259	23.8
WATAUGA	273	24.8	WILSON	701	23.8
STOKES	344	24.7	SWAIN	120	23.8
ASHE	172	24.7	HALIFAX	660	23.6
SCOTLAND	418	24.7	NORTHAMPTON	206	23.6
UNION	1008	24.5	MITCHELL	119	23.6

APPENDIX A
1988-1993 Cesarean Section Rates Ranked by Rate

Rates are per 100 live births with known method of delivery

	1988-1990 NUMBER	RATE		1991-1993 NUMBER	RATE
FORSYTH	2903	24.3	WASHINGTON	146	23.5
GATES	81	24.3	HARNETT	883	23.4
POLK	102	24.2	SURRY	581	23.3
DUPLIN	441	24.0	ROWAN	1056	23.2
NEW HANOVER	1204	23.8	ROBESON	1346	23.0
SAMPSON	481	23.8	DAVIE	247	22.9
RANDOLPH	1075	23.7	GATES	81	22.8
AVERY	134	23.6	UNION	974	22.5
CRAVEN	1134	23.6	JACKSON	207	22.3
YANCEY	133	23.5	MACON	167	22.1
HOKE	298	23.5	VANCE	454	22.1
JOHNSTON	875	23.5	GREENE	131	21.9
GRANVILLE	380	23.4	HERTFORD	220	21.7
SWAIN	140	23.3	NEW HANOVER	1157	21.7
CATAWBA	1202	23.3	MARTIN	244	21.7
HARNETT	831	23.2	WARREN	139	21.6
ALLEGHANY	52	23.1	HAYWOOD	356	21.5
NASH	819	23.0	GASTON	1750	21.4
ALAMANCE	1038	22.8	LEE	431	21.4
WARREN	160	22.6	BLADEN	273	21.3
BLADEN	281	22.5	HOKE	266	21.3
HAYWOOD	365	22.4	ONSLOW	2079	21.3
MECKLENBURG	5711	22.4	PITT	1102	21.3
MADISON	125	22.4	GRANVILLE	357	21.1
LEE	442	22.4	YANCEY	118	20.9
ANSON	264	22.4	PENDER	276	20.9
COLUMBUS	500	22.3	BUNCOMBE	1455	20.8
ROBESON	1256	22.2	NASH	767	20.7
PERSON	293	22.1	FRANKLIN	332	20.7
HERTFORD	226	22.0	ALLEGHANY	61	20.6
ONSLOW	2206	22.0	EDGECOMBE	577	20.4
CURRITUCK	103	21.9	MECKLENBURG	5421	20.3
MITCHELL	117	21.9	POLK	96	20.2
WAKE	4288	21.7	PERSON	255	20.1
EDGECOMBE	614	21.6	CASWELL	161	20.0
CHATHAM	375	21.5	GRAHAM	55	19.9
PENDER	248	20.8	CHATHAM	320	19.7
ORANGE	705	20.7	WAKE	4214	19.6
CLEVELAND	816	20.5	DURHAM	1815	19.6
GASTON	1675	20.4	MADISON	111	19.5
FRANKLIN	308	20.4	CUMBERLAND	3340	19.5
SURRY	495	20.0	WAYNE	948	19.5
DURHAM	1765	19.9	TRANSYLVANIA	175	19.3
BERTIE	180	19.5	HYDE	42	19.1
CASWELL	137	19.5	ORANGE	662	18.9
TRANSYLVANIA	170	19.4	BERTIE	166	18.8
CUMBERLAND	3276	19.3	COLUMBUS	404	18.7
WAYNE	899	18.0	CLEVELAND	709	17.7
RUTHERFORD	405	16.9	RUTHERFORD	324	13.5

APPENDIX B

1988-1993 Primary and Repeat Cesarean Section Rates Ranked by Rate

Hospitals with at least 20 births

Rates are per 100 live births with known method of delivery

	1988-1990			1991-1993	
	NUMBER	RATE		NUMBER	RATE
District Memorial Hospital	15	39.5	Betsy Johnson Memorial Hospital	405	36.6
Moore Regional Hospital	1457	38.8	Davis Hospital	611	34.5
Angel Community Hospital	36	36.4	Albemarle Hospital	803	32.8
Betsy Johnson Memorial Hospital	291	34.5	Thoms Rehab Hospital of WNC	22	31.9
University Memorial Hospital	479	33.9	Brunswick County Hospital	210	30.5
Carteret General Hospital	500	32.0	Stanly County Hospital	470	30.0
Lincoln County Hospital	433	30.6	Lincoln County Hospital	416	29.8
Wilkes General Hospital	551	30.5	Moore Regional Hospital	1093	29.7
Frye Regional Medical Center	802	30.4	Iredell Memorial Hospital	731	29.3
Pitt County Memorial Hospital	2379	29.6	Craven County Hospital	1067	29.0
Davis Hospital	404	29.6	Frye Regional Medical Center	770	28.4
Albemarle Hospital	803	29.5	Community General Hospital	487	28.1
Iredell Memorial Hospital	773	29.3	Wesley Long Hospital	960	28.0
Hugh Chatham Memorial Hospital	196	29.3	Caldwell Memorial Hospital	463	27.8
Community General Hospital	488	29.3	Beaufort County Hospital	291	27.6
Murphy Medical Center	138	28.6	Martin General Hospital	102	27.2
Martin General Hospital	156	28.4	Watauga Hospital	548	26.8
Moses Cone Memorial Hospital	2885	28.1	Lenoir Memorial Hospital	664	26.7
Washington County Hospital	71	28.0	Alamance Memorial Hospital	505	26.5
Caldwell Memorial Hospital	370	27.9	Carteret General Hospital	388	26.3
Wilson Memorial Hospital	1032	27.8	Margaret Pardee Hospital	274	26.2
Kings Mountain Hospital	59	27.8	Grace Hospital	596	26.1
McDowell Hospital	264	27.7	Presbyterian Hospital	4137	26.0
Park Ridge Hospital	303	27.4	Women's Hospital	2908	25.9
Presbyterian Hospital	5451	27.3	Richmond Memorial Hospital	430	25.8
Stanly County Hospital	420	27.3	Forsyth Memorial Hospital	4324	25.8
Brunswick County Hospital	179	27.2	Hugh Chatham Memorial Hospital	173	25.7
Maria Parham Hospital	531	27.2	High Point Memorial Hospital	1495	25.6
Lenoir Memorial Hospital	704	26.9	McDowell Hospital	226	25.3
High Point Memorial Hospital	1507	26.8	Alamance County Hospital	293	25.3
Annie Penn Memorial Hospital	297	26.8	Johnston Memorial Hospital	450	25.3
Watauga Hospital	631	26.7	Cape Fear Memorial Hospital	374	25.2
Wesley Long Hospital	965	26.7	L C Hoots Memorial Hospital	65	25.1
Halifax Memorial Hospital	740	26.2	Cannon Memorial Hospital	16	25.0
Chowan Hospital	341	26.2	Murphy Medical Center	135	24.9
Alamance County Hospital	339	25.8	Scotland Memorial Hospital	561	24.8
Forsyth Memorial Hospital	4338	25.8	University Memorial Hospital	461	24.8
Cannon Memorial Hospital	8	25.8	Onslow Memorial Hospital	1484	24.8
Memorial Mission Hospital	2437	25.8	Valdese General Hospital	262	24.6
Grace Hospital	599	25.7	Duplin General Hospital	309	24.1
Cape Fear Memorial Hospital	372	25.5	Sampson County Memorial Hospital	384	24.0
C J Harris Community Hospital	662	25.4	Park Ridge Hospital	288	23.9
Rex Hospital	2769	25.3	Randolph Hospital	390	23.9
Beaufort County Hospital	354	25.2	Wilkes General Hospital	454	23.9
Lexington Memorial Hospital	448	24.9	Cabarrus Memorial Hospital	851	23.8
Cabarrus Memorial Hospital	941	24.9	Pitt County Memorial Hospital	2130	23.6
Margaret Pardee Hospital	280	24.8	Catawba Memorial Hospital	997	23.5
Craven County Hospital	817	24.4	Halifax Memorial Hospital	694	23.5
Sampson County Memorial Hospital	409	24.0	Wilson Memorial Hospital	810	23.3
Women's Hospital	125	24.0	Chowan Hospital	314	22.7
New Hanover Regional Medical Ctr	1651	23.9	Southeastern General Hospital	900	22.7
Scotland Memorial Hospital	643	23.6	Morehead Memorial Hospital	309	22.7

APPENDIX B
1988-1993 Primary and Repeat Cesarean Section Rates Ranked by Rate

Hospitals with at least 20 births

Rates are per 100 live births with known method of delivery

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1988-1990			1991-1993		
	NUMBER	RATE		NUMBER	RATE
Central Carolina Hospital	602	23.4	Northern Hospital of Surry County	408	22.2
Alamance Memorial Hospital	493	23.0	Rex Hospital	2801	22.2
Durham Regional Hospital	1617	23.0	Maria Parham Hospital	471	22.1
Rowan Memorial Hospital	780	22.9	New Hanover Regional Medical Ctr	1586	22.1
Granville Medical Center	190	22.9	Memorial Mission Hospital	2040	22.0
Valdese General Hospital	306	22.8	Haywood County Hospital	233	21.4
Richmond Memorial Hospital	313	22.7	Rowan Memorial Hospital	689	21.3
Morehead Memorial Hospital	385	22.5	Central Carolina Hospital	575	21.3
Onslow Memorial Hospital	1578	22.5	C J Harris Community Hospital	555	21.3
Southeastern General Hospital	845	22.3	Annie Penn Memorial Hospital	270	21.3
Nash General Hospital	942	22.1	S Johnson USAF Hospital	231	21.3
L C Hoots Memorial Hospital	84	21.8	Durham Regional Hospital	1828	21.2
Duplin General Hospital	260	21.6	Granville Medical Center	195	21.0
Union Memorial Hospital	465	21.4	Union Memorial Hospital	599	21.0
S Johnson USAF Hospital	206	21.3	Cape Fear Valley Medical Center	2734	20.7
Lake Norman Regional Medical Ctr	109	21.2	Duke University Medical Center	1227	20.4
Johnston Memorial Hospital	329	21.0	Nash General Hospital	866	20.3
Columbus County Hospital	405	20.9	Raleigh Community Hospital	142	20.2
Cape Fear Valley Medical Center	2848	20.5	Ashe County Hospital	62	20.1
Naval Hospital	495	20.4	Montgomery Memorial Hospital	126	19.8
Montgomery Memorial Hospital	137	20.2	Sloop Memorial Hospital	64	19.5
Duke University Medical Center	1518	20.1	N C Memorial Hospital	1229	19.2
Catawba Memorial Hospital	830	19.7	Heritage Hospital	452	19.2
Randolph Hospital	275	19.6	Gaston Memorial Hospital	1148	19.0
Cleveland Memorial Hospital	750	19.5	Carolina's Medical Center	3065	18.8
Chatham Hospital	103	19.4	Spruce Pine Community Hospital	95	18.5
N C Memorial Hospital	1212	19.1	Roanoke-Chowan Hospital	320	18.4
Heritage Hospital	417	18.9	Wayne County Memorial Hospital	683	17.9
Anson County Hospital	152	18.8	Bladen County Hospital	139	17.8
Naval Regional Medical Center	493	18.5	Womack Army Hospital	1269	17.7
Wake Medical Center	2160	18.4	Naval Hospital	332	17.3
Spruce Pine Community Hospital	98	18.3	Wake Medical Center	1908	17.1
Bladen County Hospital	79	18.2	Lake Norman Regional Medical Ctr	124	17.1
Carolina's Medical Center	2264	18.2	Transylvania Community Hospital	135	16.9
Roanoke-Chowan Hospital	310	17.7	Mercy Hospital South	442	16.7
Transylvania Community Hospital	144	17.5	Columbus County Hospital	278	16.5
Gaston Memorial Hospital	1112	17.3	Cleveland Memorial Hospital	596	16.1
Sloop Memorial Hospital	49	16.2	Naval Regional Medical Center	501	15.8
Mercy Hospital South	253	16.1	Chatham Hospital	32	15.8
Wayne County Memorial Hospital	647	15.8	Lexington Memorial Hospital	300	15.1
Womack Army Hospital	992	15.7	Rutherford Hospital	248	11.0
Rutherford Hospital	358	15.6			
Haywood County Hospital	157	14.9			
Ashe County Hospital	24	14.5			
Northern Hospital of Surry County	214	13.6			

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